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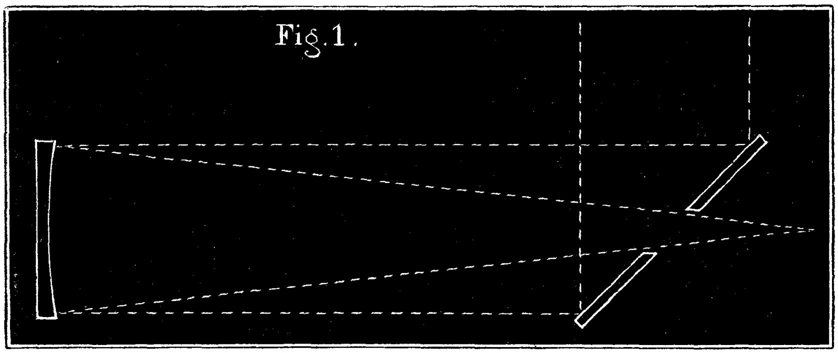
When the Sun is to be observed the diagonal is attached to the telescope by the collar C, and the course of the rays is Sun P.A., and by rotating the cube each of the tubes T can be successively brought into the position A. When a star is to be observed the diagonal is attached by C′, and the course of the rays is Star P.B., and, again, any eye-piece is brought into position by rotating.

Notes on Reflecting Telescopes and the Making of Large Discs of Glass for them. By A. A. Common, F.R.S.

In May 1884 I read a "Note on a Method of Reducing the Friction of the Polar Axis of a Large Telescope." In this note I gave a new possible form of reflecting telescope. M. Loewy must have been working at the same subject at the same time, for he gives in the June number of the *Bulletin Astronomique* the identical arrangement, carrying it further and developing the complete Coudé reflecting telescope. In thinking over the best kind of telescope to erect in a situation that is much better than my present observatory, but which is unfortunately much exposed to wind, I have been again disposed to think that a modification of the arrangement of the Coudé telescope as suggested by M. Loewy or of the arrangement suggested by myself—for it is a modification of both—might be used with good effect. This combination, as I have since found, is not new, having been described by a Mr. Benjamin Martin about 150 years ago, according to Dr. Dick, who illustrates it on pp. 288 of his *Practical Astronomer*.

Shortly, it may be described as exactly what M. Loewy describes in the *Bulletin Astronomique* as the complete Coudé reflector, but without the front or outer large plane mirror; that is, a plane mirror pierced with a hole of proper size, placed in front of the concave at a distance somewhat less than its focal length. Optically the arrangement is as given in fig. 1.

Fig. 1.



There are two ways in which such an optical combination may be used equatoreally: the first, to swing the whole on a polar axis, so that the whole can be moved in declination to any

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required point, the polar axis giving the required motion in the other direction. The other to mount the tube carrying the concave mirror rigidly at right angles to the polar axis and to give a power of rotation to the plane mirror in a plane at right angles to the axis of the concave mirror. The last way seems to be in some respects the best, as it keeps the concave mirror in a better position as regards the supports and adjustments. In considering the relative advantages of the Coudé telescope as described by M. Loewy, and such a form as this, it must at once be admitted that there is a considerable sacrifice of the many favourable points of the former, but there is some gain—the most important one, the use of only two reflecting surfaces in place of three, and the consequent greater ease and permanence of adjustment. One of the points sacrificed is the comfort of the observer, but here the loss is not so great as it seems at the first glance, for, by making the equatoreal so that the polar axis is near the plane mirror, counterposing, if necessary, the amount of movement of the eye-end may be made small. The worst feature of such an arrangement is that the telescope must be reversed on the meridian; this is, no doubt, for much work a very serious objection. When I say it must be reversed, I speak with some slight hesitation, as it might be found that the concave mirror could be supported, so that when it passed the vertical it would not perceptibly shift. This involves a rigidity of mounting that would be more or less difficult to obtain. The other way of mounting this form of telescope is not open to this objection, and it retains the relative adjustments of the two mirrors always.

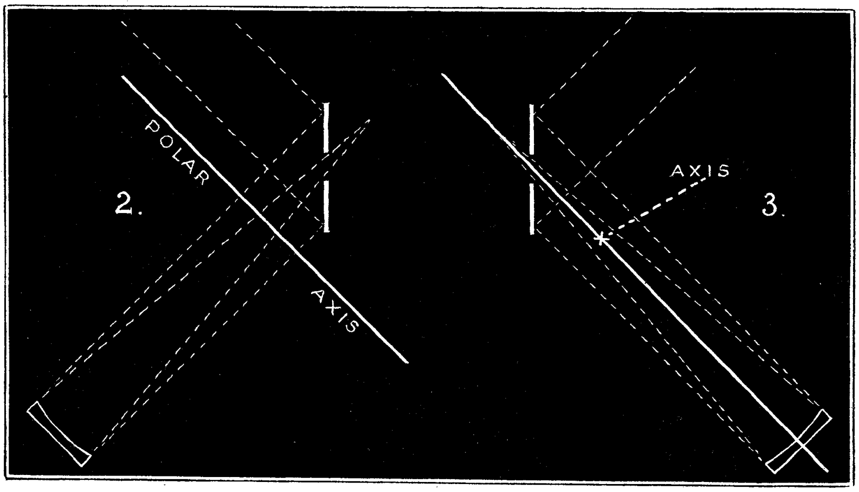

Fig. 2 gives the plan of mounting where the tube is fixed to the polar axis, and the plane mirror rotates. Fig. 3 shows the tube and the plane mirror mounted rigidly together, swinging on the polar axis in declination.

One of the very great advantages is that there will not be any diffraction rays, as in the Newtonian, caused by the supports

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of the small mirror. The loss of light would, of course, be the same as in the Newtonian.

The large discs of glass that can be made into mirrors are difficult to obtain, as there seems to be a limit that the makers can deal with at one melting. I suggested some time since to one or two glass makers that it would be possible to build up the discs by having a top and bottom disc of a moderate thickness, say for an 8-foot disc of about 2″ thick, separating these discs by a series of, say, four or five cross strips of glass of a similar thickness, not quite touching, placed crossing each other; then by using a powder of an easily fusible glass, fluxing the whole together in the annealing furnace. This seems to be worth trying, though I cannot say whether it would succeed. I offer the suggestion, as it could be tried by using a thickness of glass that the manufacturers seem to be able to produce easily.

1890 *May* 6.

Observations of Mimas, 1890. By A. A. Common, F.R.S.

On the few occasions when the weather has permitted observation, *Mimas* has been looked for with the 5-foot reflector. The following observations were made :—

		d	h	m	
1890	March	17	12	30	*Mimas* just well past W. elongation.
			12	37	Well past.
			12	45	,, ,,
	April	20	9	30	*Mimas* coming up to W. elongation.
			10	10	At W. elongation.
		29	10	30	*Mimas* in conjunction with E. end of ring; observation difficult, definition bad. (A. Taylor.)

Observations of the Planets Victoria and Sappho, made with the Cambridge Transit Circle in the Year 1889.

(*Communicated by Prof. J. C. Adams.*)

Victoria.

Date of Obs. 1889.	True Apparent R.A.			True Apparent N.P.D.			Date of Obs. 1889.	True Apparent R.A.			True Apparent N.P.D.		
	h	m	s	°	′	″		h	m	s	°	′	″
June 25	19	59	11·66	96	38	58·67	July 30	19	32	47·58	94	41	2·98
26	19	58	40·32	96	31	26·34	Aug. 3	19	30	12·94	94	47	1·15
27	19	58	7·25	96	24	8·77	5	19	29	5·25	94	51	12·14
July 5	19	52	49·19	95	33	38·07	6	19	28	34 09	94	53	34·07
11	19	48	5·69	95	6	3·99	15	19	25	17·99	95	21	47·04
18	19	42	13·50	94	45	51·51	17	19	24	56·87	95	29	26 01
23	19	38	4·71	94	39	23 73	29	19	25	54·51	96	20	51·07